CLAIMS

I/We claim:

[c1] 1. A method for making a portion of an aircraft control system, comprising:

selecting an actuator mechanism rate capability and an actuator mechanism load capability;

selecting at least one operating requirement;

determining the number and size of a plurality of control surfaces that are required to satisfy the at least one operating requirement during operation in an adjacent flow field so that, in response to at least one command signal, each control surface is actively positioned by one or more actuator mechanisms having the actuator mechanism rate capability and the actuator mechanism load capability; and

installing the control surfaces side by side along at least approximately an entire span of a trailing edge of an aircraft wing from a first trailing edge tip of the wing to a second trailing edge tip of the wing.

[c2] 2. The method of claim 1, further comprising installing the control surfaces side by side along at least approximately an entire first span portion and an entire second span portion, wherein the first span portion extends from a first trailing edge tip of the wing to a first side of a fuselage and a second span portion extends from a second side of the fuselage to a second trailing edge tip of the wing.

[c3] 3. The method of claim 1 wherein the aircraft wing includes a supercritical airfoil with a forward portion, and wherein the method further comprises coupling at least one of the control surfaces to the forward portion of the supercritical airfoil, so that the at least one control surface is configured to

change a physical characteristic of a slot, defined by the forward portion of the supercritical airfoil and the at least one control surface, as the at least one control surface is actively positioned.

[c4] 4. The method of claim 1, further comprising positioning at least one control surface to roll the aircraft, increase a drag of the aircraft, or both.

[c5] 5. The method of claim 1 wherein installing the control surfaces includes installing first control surfaces along the trailing edge of the wing and installing second control surfaces on other portions of the aircraft.

[c6] 6. A method for sizing at least a portion of a vehicle control system, comprising:

selecting an actuator mechanism capability;

selecting at least one operating requirement; and

determining the number and size of a plurality of control surfaces that are required to satisfy the at least one operating requirement during operation in an adjacent flow field so that, in response to at least one command signal, each control surface is actively positioned by at least one actuator mechanism having the actuator mechanism capability.

[c7] 7. The method of claim 6, further comprising determining the location of the control surfaces.

[c8] 8. The method of claim 6, further comprising selecting the locations available for locating the control surfaces prior to determining the number and size of the control surfaces.

[c9] 9. The method of claim 6 wherein selecting the actuator mechanism capability includes selecting a maximum actuation rate.

[c10] 10. The method of claim 6 wherein selecting the actuator mechanism capability includes selecting a maximum actuation force.

[c11] 11. The method of claim 6 wherein selecting the actuator mechanism capability includes selecting a maximum actuation rate and a maximum actuation force.

[c12] 12. The method of claim 6 wherein selecting the actuator mechanism includes selecting the actuator mechanism to include one actuator.

[c13] 13. The method of claim 6 wherein selecting the actuator mechanism includes selecting the actuator mechanism to include at least two actuators.

[c14] 14. The method of claim 6, further comprising installing the control surfaces on a vehicle.

[c15] 15. The method of claim 6 wherein the control surfaces include first control surfaces and the actuator mechanisms include first actuator mechanisms and wherein the method further comprises selecting at least one second control surface to be actively positioned by a second actuator mechanism having a capability different than that of the first actuator mechanisms.

[c16] 16. The method of claim 6, further comprising installing the control surfaces on an external fluid flow body.

[c17] 17. The method of claim 6, further comprising coupling the control surfaces to an aircraft wing.

[c18] 18. The method of claim 6, further comprising:

installing the control surfaces on an aircraft, wherein the aircraft includes a wing, the wing having a forward portion with a leading edge and a trailing edge, the trailing edge of the forward portion having a span extending from a first wing trailing edge tip to a second wing trailing edge tip; and

coupling the control surfaces side by side to the wing wherein at least a portion of each control surface is aft of the trailing edge of th forward portion of the wing and wherein the control surfaces are distributed across at least approximately the entire span of the trailing edge.

[c19] 19. The method of claim 6, further comprising:

installing the control surfaces on an aircraft, wherein the aircraft includes a wing, the wing having a forward portion with a leading edge and a trailing edge, the trailing edge of the forward portion having a first span extending from a first wing trailing edge tip to a first side of a fuselage and a second span extending from a second side of the fuselage to a second wing trailing edge tip; and

coupling the control surfaces side by side to the wing, wherein at least a portion of each control surface is aft of the trailing edge of the forward portion of the wing, and wherein the control surfaces are distributed across at least approximately the entire first span and the entire second span.

[c20] 20. The method of claim 6, further comprising:

installing the control surfaces on an aircraft having a supercritical airfoil with a forward portion; and

coupling at least one of the control surfaces to the forward portion of the supercritical airfoil, wherein the at least one control surface is configured to change a physical characteristic of a slot, defined by the forward portion of the supercritical airfoil and the at least one control surface, as the at least one control surface is actively positioned.

[c21] 21. The method of claim 6 wherein selecting the at least one operating requirement includes selecting at least one of a fluid velocity, a fluid temperature, a fluid density, an inoperative control surface, and a power plant failure.

[c22] 22. A method for sizing a vehicle control system, comprising:

selecting a set of control laws;

selecting at least one operating requirement; and

determining the number and size of a plurality of control surfaces that are required to satisfy the at least one operating requirement during operation in an adjacent flow field so that, in response to at least one command signal that is governed, at least in part, by the set of control laws, each control surface is actively positioned by an actuator mechanism having the actuator mechanism capability.

[c23] 23. The method of claim 22, further comprising determining the location of the control surfaces.

[c24] 24. The method of claim 22, further comprising selecting an actuator mechanism capability before determining the number and size of the plurality of

control surfaces, wherein each control surface is actively positioned by a corresponding actuator mechanism having the actuator mechanism capability.

[c25] 25. The method of claim 22, further comprising selecting an actuator mechanism capability before determining the number and size of the plurality of control surfaces, wherein each control surface is actively positioned by a corresponding actuator mechanism having the actuator mechanism capability, and wherein each corresponding actuator mechanism includes at least two actuators.

[c26] 26. The method of claim 22, further comprising defining the locations available for the control surfaces prior to determining the number and size of the control surfaces.

[c27] 27. The method of claim 22 wherein the set of control laws is coded in a computer program for controlling the actuator mechanisms to satisfy the at least one operating requirement by actively positioning the control surfaces.

[c28] 28. A portion of a vehicle control system, comprising:

at least one external fluid flow body having a forward portion with a first flow surface, a second flow surface facing opposite the first flow surface, and a trailing edge at a juncture of the first flow surface and the second flow surface, the trailing edge having a span extending from a first trailing edge tip to a second trailing edge tip;

a plurality of control surfaces, each having at least a portion aft of the trailing edge of the external fluid flow body, the control surfaces being movable relative to the at least one external fluid flow body to control forces and moments on the external fluid flow body by interacting with an adjacent flow field; and

a plurality of actuator mechanisms, each having an approximately identical control capability, at least one actuator mechanism being coupled to each of the control surfaces to actively position the control surfaces in response to command signals.

[c29] 29. The system of claim 28 wherein the control surfaces are distributed across at least approximately the entire span of the trailing edge.

[c30] 30. The system of claim 28 wherein the control surfaces are installed on an aircraft and wherein at least one of the control surfaces can be positioned to cause the aircraft to roll, increase a drag of the aircraft, or both.

[c31] 31. The system of claim 28 wherein the control capability includes a maximum actuation rate.

[c32] 32. The system of claim 28 wherein the control capability includes a maximum actuation force.

[c33] 33. The system of claim 28 wherein the control capability includes a maximum actuation rate and a maximum actuation force.

[c34] 34. The system of claim 28 wherein the actuator mechanisms each include a single actuator.

[c35] 35. The system of claim 28 wherein the actuator mechanisms each include at least two actuators.

[c36] 36. The system of claim 28 wherein the actuator mechanisms each include a hydraulic actuator.

[c37] 37. The system of claim 28 wherein at least one of the control surfaces is coupled to two actuator mechanisms.

[c38] 38. The system of claim 28 wherein the external fluid flow body includes an airfoil coupled to an aircraft and wherein the span is noncontinuous, with a first span portion extending from the first trailing edge tip to a first portion of the aircraft and a second span portion extending from a second portion of the aircraft to the second trailing edge tip, and wherein the plurality of control surfaces are distributed across at least approximately the entire first span portion and the entire second span portion.

[c39] 39. The system of claim 28 wherein the at least one external fluid flow body includes an airfoil, the airfoil extending through an aircraft fuselage, the span being noncontinuous, with a first span portion extending from the first trailing edge tip to a first side of the aircraft fuselage and a second span portion extending from a second side of the aircraft fuselage to the second trailing edge tip, and wherein the control surfaces are distributed across at least approximately the entire first span portion and the entire second span portion.

[c40] 40. The system of claim 28 wherein the at least one external fluid flow body includes a forward portion of a wing coupled to an aircraft, the forward portion of the wing having a trailing edge, the span extending from a first trailing edge tip of the forward portion of the wing to a second trailing edge tip of the forward portion of the wing, and wherein the plurality of control surfaces ar distributed across at least approximately the entire span.

[c41] 41. An aircraft, comprising:

a fuselage;

a forward wing portion, the forward wing portion having a leading edge and a trailing edge, the trailing edge of the forward wing portion having a

span extending from a first trailing dge tip to a second trailing dge tip;

a plurality of control surfaces, each having at least a portion positioned aft of the trailing edge, the control surfaces being distributed across at least approximately the entire span of the trailing edge, the control surfaces being movable relative to the forward wing portion to control forces and moments on the forward wing portion by interacting with an adjacent flow field; and

a plurality of actuator mechanisms, each having an approximately identical control capability, each actuator mechanism being coupled to a control surface to actively position the corresponding control surface in response to command signals.

[c42] 42. The system of claim 41 wherein the span is noncontinuous and includes a first span portion extending from the first trailing edge tip to a first side of the fuselage and a second span portion extending from a second side of the fuselage to a second trailing edge tip, and wherein the multiple control surfaces are distributed across at least approximately the entire first span portion and the entire second span portion.

[c43] 43. The system of claim 41 wherein the forward wing portion includes a forward portion of a supercritical airfoil, and wherein at least one of the control surfaces is coupled to the forward portion of the supercritical airfoil, the at least one control surface being configured to change a physical characteristic of a slot, defined by the forward portion of the supercritical airfoil and the at least one control surface, as the at least one control surface is actively positioned.